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ABSTRACT

This paper advocates that a creation model, as well as an evolution model, should be presented to students when discussing the origins of life. The author argues that the traditional evidence supporting evolution is circumstantial in nature, whereas a major prediction from the creation model (that gaps exist between distinct kinds of living animals and plants) is confirmed by conclusive evidence. Evolution, like creation, is a faith and not open to scientific investigation. Yet evolution is taught as a dogma in the public schools as evidenced by: (1) indoctrination in the belief of spontaneous generation, (2) indoctrination in the belief in transitional forms between different kinds of organisms, and (3) indoctrination in the belief in mutations as the raw material of evolutionary change. It is suggested that science teachers admit that there are sound scientific and pedagogical reasons why both the evolution model and the creation model should be taught, as objectively as possible, whenever teachers and students are discussing origins. (JR)

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"Origins of Life: A Current Controversy"

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Introduction

Scientists are searchers for true explanations of all aspects of their natural environment. They search for true explanations of physical and biological aspects of their immediate environment, and even for true explanations about material objects in distant space. And, because of the complete dedication of the scientist to resolution of "cause and effect" where ever possible, a logical component of scientific thought involves questions of origin; that is, origin of the material universe, of life, and of mankind.

Yet, it can be stated conclusively that no man, as a scientist, was eye witness to the beginning of the material universe, nor the beginning of life, nor mankind. Because of necessary restrictions of scientific study to the material, and direct or indirect observation of repeatable events, we find that scientific researchers have failed to find scientific answers to questions about origin of the material universe, of life, and of mankind.

However, some thinkers have offerred imaginary explanations about origins, and other researchers have sought answers to these questions of origins in the writings of ancient peoples. Ancient histories and ancient philosophies have been searched for answers to these questions of origins. Basically, there are two major views; namely, origin by evolution, or origin by special creation.

Thoroughly consistent evolutionists believe that this universe, and life within it, came into existence by time and chance, through a process of natural selection and survival of the fittest. This is said to have occurred over a vast period of time.

Life is said to have started to "evolve" in what is known as the pre-Cambrian Period, but indisputable fossil evidence of life is first found in myriad abundance in the Cambrian, which is dated millions of years ago. Most of you are familiar with the order of evolution. Evolutionists believe that the first cell "evolved" from inorganic material. From it eventually all the other forms of life "evolved". Such changes would have been from the invertebrates (such as the trilobites) to the vertebrates (such as fish with backbones) to amphibians (such as frogs). Supposedly from the amphibians the reptiles "evolved", then from reptiles came the mammals and finally the primates, with man at the top. This interpretation of the prigin of life has been well discussed by G. A. Kerkut in his book, Implications of Evolution (New York: Pergamon Press, 1960).

Now the view of origin by special creation is presented in many ancient writings and classical works. For ease of reference I will draw upon those sentences found in Genesis 1 of the Holy Bible. I am asked, often, why I turn to Genesis and not to the Koran, or to another source of ancient writings. I turn to Genesis 1 because I know that a scholarly case can be propounded for the position that Babylonian, Sumerian, Greek, or Roman writings, and even the writings in the Koran and from Confucius and Buddha, are derivates of the very ancient Judaic tradition most succinctly expressed in the Genesis record.

In the Genesis record or account, the first day appears to involve the initial creation of the universe, including the earth's basic structure. This first description of the earth is of water covering its surface and darkness enveloping the earth. And God said, "Let there be Light".

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On the second day the waters were divided into two great reservoirs, one above the expanse, or troposphere, and one below. And on the third day land and the seas and vegetation appeared, with each kind of plant commanded to yield seed after its kind. On the fourth day God made two great lights, the greater to rule the day and the lesser to rule the night; he made the stars also.

On the fifth day water creatures and winged fowl were created and commanded to reproduce after their kind. And on the sixth day we read of the creation of land animals and man, with each commanded to reproduce after its kind.

Thus, literal interpretation of the Biblical account as a historical record would indicate an immediate full-grown creation, having the appearance of age. Also many creationists attribute much of the earth's sedimentary a nd fossil-bearing strata to consequences of a Divine, catastrophic judgement upon the inhabitants of the ancient world by means of the Noachian Flood.

By the way, actual discussion, in public school classrooms, of the evolutionary interpretation and the creation interpretation about origins should not seem so strange to those who have read Joseph Ciparick's article, "Myths and Models: The Problem of Origin", in the January, 1973, issue of the NSTA journal, The Science Teacher.

Correlation of Evidence According to Two Interpretations

Now, let me point out that each pattern of interpretation, the evolutionary and the special creation explanation, are both outside the limits of scientific observation. I do agree with Dr. William V. Mayer in the BSCS Newsletter of November, 1972 that criticisms of science should be in terms of the parameters of the discipline of scientists. Please, then, remember that origin of the material universe, of life, and of mankind are forever beyond observation of repeatable events and collection of experimental evidence. Therefore, we can ask quite properly: Which interpretation may be used successfully as a frame of reference as a model, which is the term I prefer, by which scientifically repeatable facts that scientists do have, may be correlated and organized for the purpose of formulating testable predictions within the discipline of scientists?

Noteworthy is the fact that there are basically two kinds of scientific evidence that must be kept in mind in any approach to consideration of "evidences" put forward as support for the evolution model or for the creation model, as I shall call these frames of reference. One category of scientific evidence may be classified as circumstantial evidence. There is evidence that may be explained persuasively from more than one point of view; that is, this kind of evidence may be used to support different conclusions, if different assumptions or sets of assumptions are taken for granted as "given". The other category of scientific evidence is classified as conclusive evidence. There is evidence that leads to one clear and logical conclusion or explanation. If the evidence is true, then only one obvious conclusion may be drawn seriously from the evidence.

Right at this point I must caution against a very common tendency these days on the part of leading evolutionists and biology textbook writers to equivocate evolution (i. e., supposed end results) with natural selection(i. e., proposed process or means). A close check of written expressions of leading evolutionists and contents of chapters on evolution explicates the fact that the term "natural selection" is equated literally with the term "evolution". Thus a confusion is perpetrated between "ends" and "means".

A specific example, among many that might be cited, of such confusion of "ends" (evolution) and "means" (natural selection) is found in introductory statements of J. Maynard Smith when he discussed, "The Status of Neo-Darwinism" in Towards a Theoretical Biology in 1969 (2, Sketches. Edited by C. H. Waddington. Chicago: Aldine Publishing Co., p. 82).

First he presented the idea that evolution, that is, the origin of one kind of organism from another kind of organism, occurred by (or was the result of) natural selection and Mendelian heredity. Then he proceeded to refer to supposed successful support of the theory of evolution. However, in actuality, Smith merely itemized possible advances in our understanding of natural selection and Mendelian heredity. Due to a sad lack of precision in scientific methodology, that results in failure to differentiate evolution (supposed end results) from natural selection(supposed process or means), many, many evolutionists make the tacit assumption that substantial experimental and field data that may be used to support the concept of natural selection are useful also as support for evolution.

Since the heart of scientific method is the problem-hypothesis-test process, then, necessarily, the scientific method involves predictions. And predictions, to be useful in scientific methodology, must be subject to test empirically. But is this the case with regard to evolution? Are repeatable observations involved in discussions of supposed evolutionary change of one kind of organism into another kind of organism? I define the term "kind" as given by evolutionist Ernst Mayr, as follows: "Different forms of life were referred to as 'types' by the comparative anatomists of the last century and even earlier. Bats, whales, birds, penguins, snails, sea urchins, and all the other well-known kinds of animals and plants are such types." (Emphases added to draw attention to apparent ease of interchangeable use of these three terms. 1963. Cambridge, Mass.: The Belknap Press of Harvard University Press, p. 588.)(Animal Species and Evolution)

a. What about the Evolution Model?

In attempting to develop true explanations about origin of the diversity of living things, evolutionists ordinarily present so-called evidences for evolution under such headings as: 1. comparative anatomy, 2. comparative embryology, 3. comparative blood and protein analyses, 4. rudimentary or vestigial organs, 5. the fossil record, and 6. Mendelian or population genetics. But how must data from these six main areas of research be evaluated? Most conclusively, ONLY circumstantial evidence is involved. The editor of The American Biology Teacher has published detailed analyses by Dr. Duane T. Gish and myself in the current March issue and the January issue, respectively. Also I have published other detailed analyses in the Michigan Science Teachers Bulletin (October-November, 1972), The Journal of the American Scientific Affiliation (December, 1972), and the Creation Research Society Quarterly (December, 1972). Due to time limitations, I will merely assert here:

1. No lineal or genetic relationship, but only circumstantial similarity may be gained from any comparison of whole skeletons, or particularly, the forelimbs, of fish, frog, bat, horse, chimpanzee, and human being.

2. No lineal or genetic relationship, but only circumstantial similarity may be gained from any comparison of embryos of fish, salamander, turtles, chicken, pig, dog, and human being. (Despite drawings, still in use, by E. Haeckel, Anthropogenie, 1874. Tables IV and V)

3. No lineal or genetic relationship, but only circumstantial similarity may be gained from any comparison of blood types, hemoglobin or amino acid sequences in DNA molecules of cotton, castor bean, sunflower, and buckwheat seeds; Neurospora; Drosophila; tuna; pigeon; rabbit; cow; chimpanzee; and human being. (See Dickerson, Scientific American, April, 1972)

4. No lineal or genetic relationship, but only circumstantial similarity may be gained from any comparison of muscles of the ear, appendix, tissue of the eye, and other aspects of the human body with aspects of other organisms.

5. No lineal or genetic relationship, but only circumstantial appearance of succession or sequence may be gained from any study of fossil remains and/or inclusions in rock strata. No sufficient and necessary grounds for claiming one organism as the ancestor of another may be gained from study of rock strata, because such study partakes unavoidably in the logical fallacy of post hoc ergo propter hoc ("after this, therefore, because of it"). The fallacy involves the error of taking something as the cause for another thing merely because of being earlier in time. Absolutely no genetically established transitional forms have been found in the rock strata.

6. Lastly, no lineal or genetic relationship of major kinds of animals or major kinds of plants may be gained from all the studies of Mendelian genetics, or even from population

genetics. Only circumstantial evidence, that many present persuasively for evolution, may be gained from all genetic studies, which must be classified properly as no more than tests of natural selective, variational phenomena. And again, I must caution against equivocation of "natural selection" and "evolution".

Recombinations of genetic materials do not result in new types or new kinds of living organisms. Such changes as do occur are always WITHIN limits of known types or kinds of organisms. Unbridgeable breeding gaps between different kinds of plants and between different kinds of animals are known and fully documented. Furthermore, mutations are NOT sources of new traits, but only modifications or characteristic expressions of already existing traits. Specifically, mutations result only in changes within an existing genic structure; therefore, the fundamental genotype remains unchanged within a given organsim as far as traits are concerned.

b. What about the Creation Model?

Data from comparative anatomy, comparative embryology, comparative blood and protein analyses, rudimentary or vestigial organs, the fossil record, and Mendelian or population genetics do NOT afford conclusive evidence in support of the evolution model by which a majority of biologists try to explain the origin of the diversity of living things. How useful, then, might the creation model be for correlating scientific data and developing a true explanation of how diversity of living things originated? How useful might the creation model be for formulation of predictions, which many use as a criterion for judging an ideational model?

A major prediction from the creation model would be that researchers would expect to find gaps between distinct kinds or types of living animals and plants, with different degrees of variability WITHIN known kinds of animals and plants; and, further, gaps between kinds or types of extinct animals and plants as evidenced in the fossil record. Full confirmation in the form of conclusive evidence for this prediction from the creation model may be obtained. Again, due to time limitations I will merely assert here:

1. Careful resea rch and interpretation of data from comparative anatomy results in accumulation of conclusive evidence of unique and specific characteristics and permanent gaps between major kinds of living and extinct organisms.
2. Careful research and interpretation of data from comparative embryology results in accumulation of conclusive evidence of unique and specific characteristics and permanent gaps between major kinds of living organisms.
3. Careful research and interpretation of data from comparative blood and protein analyses results in accumulation of conclusive evidence of unique and specific characteristics and permanent gaps between major kinds of living organisms.
4. Careful research and interpretation of data from study of rudimentary or vestigial organs results in accumulation of conclusive evidence of unique and specific characteristics and permanent gaps between human beings and other kinds of living organisms.
5. Careful research and interpretation of data from the fossil record results in accumulation of conclusive evidence of unique and specific characteristics and permanent gaps between major living and extinct kinds of organisms.
6. Careful research and interpretation of physical data from Mendelian genetics or population genetics, involving gene combinations and recombinations, hybridization, mutation, migration, isolation, distribution, and selection (both artificial and natural), results in accumulation of conclusive evidence of unique and specific characteristics and permanent gaps between major kinds of living organisms.

The point to be emphasized over and over is that minor changes do occur in living organisms, but the changes are always within bounds of a certain type or kind. Of course, this is in exact agreement with the pattern found in Genesis 1, that is, "after their kind" or "after his kind". The declaration may be made confidently that "fixity of kinds" is the scientifically documented prediction from the creation model; that is, supported by all physical evidence. And "fixity of kinds" might well be understood as the modern day equi-

valent of the Biblical "after his kind" or "after their kind".

Furthermore, the fact of the world-wide distribution of the most evident sedimentary rocks is utilized by creationist scientists as at least circumstantial evidence of a world-wide flood. Geologists are agreed that sedimentary rocks are the result of slow accumulation under water of sediments and fragmental particles of rocks. When this fact is considered, along with multiple examples of polystrate fossil tree trunks in many places on the surface of the earth, plus many examples in rock strata of app arant "mass burial" of fish and other kinds of organisms, a highly significant circumstantial case may be developed in support of the concept of a world-wide flood.

As a summary of what I have said so far, it must be clear that evolution has never been proved as a scientific fact; has never been substantiated by any laboratory experiments. Evolution, therefore, is neither fact nor hypothesis nor theory. It is a belief, a faith, and nothing more. Of course, like evolution, creation is not accessible to the scientific method. Concepts about origins and events that are not presently observable, because they are not repeatable, are involved in both evolution and creation.

However, evolution and creation may be formulated as conceptual models, with which men can try to correlate facts and even make predictions. Yet, neither model may be proved; neither model may be tested directly. The evolution model and the creation model may be compared only in terms of the relative success with which they can be used to explain data which exist in the real world. As I have shown, creation is actually a far more effective model for correlating scientific data than evolution; and, evolution requires a far more credulous religious faith in the illogical and unproveable than does creation. I will now examine briefly this last assertion.

Comparative Basis of Two Faiths

Evolution and creation, then, are basically two faiths that men have used over the centuries to develop explanations of origins. Evolution and creation are essentially belief systems. As Joseph Ciparick expressed in the middle column of page 23 of his Science Teacher article last January: "The presentation of the theory of evolution ... demands a great deal of faith." And, of course, neither the evolution model nor the creation model may be constituted properly as a scientific theory. Each system rests unavoidably upon certain assumptions or "givens", which do not involve any prior observations, or repeatable events, as is characteristic of scientific theories.

It is true that the creation model is based upon acceptance of the existence of Eternal God, the Creator, the Prime Mover. The existence of God is taken on faith. However, in so doing, the creationist scientist utilizes the fundamental assumption accepted by all scientists; namely, "cause and effect": if there is an effect, then there is a cause.

But, in comparison, the evolution model also is based upon a faith commitment. The evolution model is based upon acceptance of spontaneous generation of life substance from some "eternal" matter. Quite candidly, I want to be understood carefully as asserting that modern-day biologists, who follow the work of Miller, Fox, and Ponnamperuma (whom many of us heard in lecture earlier this afternoon), are believers in spontaneous generation of life substance at the sub-microzoic level. Such is the clear admission of Nobel Prize winner George Wald, who has written often in the last 10 years that "... there are only two possibilities: either life arose by spontaneous generation, ... or it arose by supernatural creation..." (Theories of Origin of Life. Boston: Houghton Mifflin Co., 1962, p. 187).

Please note that Wald's belief is not a belief in spontaneous generation of whole organisms at the macrozoic level attributed to some Greek thinkers and systematically denied through carefully controlled experimentation by Francisco Redi. Nor did Wald refer to spontaneous generation of life substance at the microzoic level, once maintained by Pouchet and

other French scientists, but so aptly denied by Louis Pasteur, a creationist scientist, by means of controlled experimentation with his famous swan-neck flasks. Nor is the spontaneous generation of life substance that Wald referred to at the level of cosmozoic source of life. To say that life began on some celestial object only leads logically to the question, "How did that life originate?" (See Josephine Marquand. 1968. Life: Its Nature, Origin and Distribution. New York: W. W. Norton & Company, Inc., pp. 30 thru 33 and summary table, p. 34)

Please note, further, that belief in spontaneous generation of life substance at the sub-microzoic level from "eternal" matter entails the concept that inherent in matter eternally has been the potentiality for organization into life. Such a concept is in complete contradiction of the universally established scientific law of the Second Law of Thermodynamics. And such a belief fails to include a "cause" for that so-called inherent, eternal characteristic of matter. Though "time" is offered as the "hero of the plot" by Dr. Wald, or others might propose "chance", we must admit, as science teachers, that neither "time" nor "chance" supply any energy, nor any organizational pattern, now known to be so essentially important to life substance and cellular form.

Mistakenly, many biochemists, zoologists, and biologists believe that scientific and technological advances either have made possible, or will make possible, the study of spontaneous generation of life. Designed after the pattern of experiments by Miller and Fox, researchers attempt to simulate what they believe to have been the original atmosphere of the earth. And upon reporting such research, some writers even claim that life has been "created".

Rather than "creating" any life components, however, such research effort at best results in synthesis of possible building blocks of living substance, i. e., amino acids. Using a known "recipe", research men combine certain amounts of already existing materials, which are of some unknown origin, and which they think were present near the earth at the time of appearance of the first life. Then, subjecting such a known mixture to a certain electric charge, they have successfully SYNTHESIZED amino acids. But no accidental combinations have occurred since careful controls have been used. Thus multiple repetitions are possible, and a paramount requirement of top-level scientific work is satisfied.

However, in no way may it be said that researchers have simulated or imitated supposed spontaneous generation of life. Scientists are literally unable to study spontaneous generation. By definition, the term "spontaneous" means unaffected by external intervention.

In the mentioned experiments that resulted in synthesis of amino acids, scientists have used careful plans or designs for their work; and, thus, human intervention is very much in volved. Thus, upon careful analysis, no true spontaneity may be claimed. (See Duane T. Gish. 1972. Speculations and Experiments Related to Theories on the Origin of Life: A Critique. San Diego: Institute for Creation Research, 2716 Madison Ave.--$2.50)

It is true that scientists have reasoned carefully regarding supposed conditions on the "primaeval" earth. It is true that researchers have put together already existing materials in measured fashion. It is a fact that for a calculated length of time, these men have subjected the known mixture to a measured amount of electric charge. However, in each of these aspects of the Miller and Fox work, human intervention is quite clearly involved, and no spontaneous characteristic is evident. Admittedly, there are instantaneous reactions; however, absolutely no true spontaneity has occurred.

And further, the very identification of human mental planning necessary to bring about synthesis of amino acids is an ample basis for suggesting analogically that mental intervention (identified by many as Divine) was involved at the time of the first appearance of life on the earth. That is, God, the Creator, was the "cause" of the first life.

Presumably, according to uniformity of cause and effect relationship of events, an excellent basis is gained for maintaining that Divine mental intervention was involved when

the first life came on the earth. Here is the age-old "design argument" that Darwin and his followers for the last 100 years have thought worthless and have ignored. Sadly, Darwin and even molecular biologists today have ignored the design argument. But, A. E. Wilder Smith shows clearly in his book, The Creation of Life (A Cybernetic Approach to Evolution) (Wheaton, IL: Harold Shaw Publishers, 1970) that modern scientific findings may be used very successfully to support design as evidence for Mind and Consciousness.

Summation and Suggestions

In summary, I assert that evolution is not a scientific fact. No experiments nor any conclusive evidence may be adduced to support the evolution model. Some evolutionists think that they have data to support evolution when in all actuality they have support only for aspects of natural selection and genetic variability. Nothing but circumstantial evidence may be offerred in supposed support of the evolution model.

Contrariwise, the creation model is well supported indirectly by means of conclusive evidence for the major prediction of gaps between major kinds of animals and major kinds of plants, both living and extinct.

The evolution model is based squarely upon belief in spontaneous generation of life substance from "eternal" matter at the sub-microzoic level. Such a belief involving "time" and "chance" violates the fundamental "cause and effect" assumption of all scientific endeavor. The creation model, however, is based on belief in an eternal Creator God which is fully in keeping with cause and effect thinking. Human intervention in successful synthesis of amino acids means full well that Divine Intervention might have been involved in the origin of the first life on the earth.

Clearly evolution is a faith. Creation is a faith. Neither are open to scientific investigation as far as past events is concerned. But evolution is maintained today as a dogma. This claim, that evolution is a dogma, is easily evidenced in the selected indoctrination in three sub-beliefs practiced in public schools across this nation, and in educational institutions around the world. First, is indoctrination in the belief in spontaneous generation of life substance without a shred of evidence. Second, is indoctrination in the belief in transitional forms between different kinds of organisms, which is fully deniable on the basis of anatomy, embryology, blood and protein analyses, fossils, and genetics. And, third, is indoctrination in the belief in mutations as a source of raw materials by which supposed evolutionary changes in organisms might have come about in the past.

I suggest that science teachers admit that there are sound scientific and pedagogical reasons why both the evolution model and the creation model should be taught, as objectively as possible, in public school classrooms whenever teachers and students are discussing origins. Science teachers can carefully and clearly present arguments pro and con for each model. Such treatment is necessary for minimum, basic compliance with academic freedom. But, also, this pro and con approach is required since some students and their parents believe in creation, some believe in evolution, and some are undecided in their beliefs. Hence, the public schools should be neutral and science teachers should either teach both models or teach neither model of origins. Such is the clearly equitable and constitutional approach.

Further, I suggest that no one need "fear" about violation of "separation of church and state", if such equitable treatment abounds. Court decisions restricting "religious" teaching in the public schools do not apply to "creation" teaching about origins.

On the contrary, a very good case might be presented that violation of church and state has occurred already by means of the now established, exclusive manner in which science teachers across this land, and around the world, have selectively indoctrinated students at

various educative levels in only one model about origins, that is, the evolution model. The predominant "religion" of naturalism and humanism so commonly applied by science teachers during discussions of origins has been, in effect, the established religion of the State for a 100 years.

I recommend, further, that science teachers can serve their responsibility as public servants, as teachers of young formative minds, by putting their own "house in order", before parents and legislators seize the initiative to protect the civil rights and the academic freedom of students and science teachers alike. Science teachers can take full advantage of already available reference books, primary textbooks, supplementary textbooks, laboratory materials, films, and film strips which have been prepared by creationist scientists. Also science teachers can take advantage of a type of in-service training through seminars and summer institutes that have been inaugurated in many states in recent years.

I suggest and recommend that now is the time for all good science teachers to come to the aid of responsible science teaching regarding origins. The responsibility and initiative should rest properly with science teachers, and certainly not with legislators. Any study of origins is a vital part of the field of specialty of the science teacher.

Science teachers arise!!! Science teachers, put your "house in order" by teaching BOTH the evolution model and the creation model of origins, so that you protect the civil rights and also the academic freedom of your students and your own rights and academic freedom, as well.

--BIBLIOGRAPHY--

BIOLOGY: A Search for Order in Complexity. Edited by John N. Moore and Harold S. Slusher. 1970. Zondervan Publishing House, Grand Rapids, MI ($7.95)

Laboratory Manual: Investigations into Biology. (Student Manual) (Teacher's Manual) June 29, 1973. Zondervan Publishing House, Grand Rapids, MI ($1.95 each)

Teacher's Guide. By Olive Fischbacher, Ralph Paisley, and William J. Tinkle. April 23, 1973. Zondervan Publishing House, Grand Rapids, MI ($1.95)

Creation or Evolution? By David D. Riegle. 1971. Zondervan Publ. House, Grand Rapids ($0.95)

Critique of Radiometric Dating. By Harold S. Slusher. 1973. Institute for Creation Research, San Diego ($2.50)

Darwin Retried (An Appeal to Reason) By Norman Macbeth. 1971. Gambit Incorporated, 53 Beacon Street, Boston ($6.95)

Evolution: Possible or Impossible? By James F. Coppedge. April 27, 1973. Zondervan Publishing House, Grand Rapids, MI ($3.95)

Evolution? The Fossils Say NO! By Duane T. Gish. 1972. Institute for Creation Research, San Diego ($0.95)

In the Beginning (A Study of Creation versus Evolution for Young People) By Rita Rhodes Ward. 1965. Baker Book House, Grand Rapids, MI ($1.25)

Origin and Destiny of the Earth's Magnetic Field. By Thomas G. Barnes. 1973. Institute for Creation Research, San Diego ($2.50)

Science and Creation (A Handbook for Teachers) By Henry M. Morris, William W. Boardman, Jr., and Robert F. Koontz. 1971. Available from Institute for Creation Research, San Diego ($3.50)

Scientific Studies in Special Creation (Anthology of Scientific Articles) Edited by Walter E. Lammerts. 1971. Baker Book House, Grand Rapids, MI ($6.95)

Should Evolution Be Taught? Pamphlet by John N. Moore. 1970. Available from Box 207, East Lansing, MI ($0.25)

Why Not Creation? (Anthology of Scientific Articles) Edited by Walter E. Lammerts. 1970. Baker Book House, Grand Rapids, MI ($7.50)

Why Scientists Accept Evolution. By Robert T. Clark and James D. Bales. 1966. Baker Book House, Grand Rapids, MI ($1.95)